ABSTRACT

A method and apparatus for measuring dry density and gravimetric water content of soil includes the steps of providing a plurality of spikes adapted to be driven into the soil and driving the spikes into the soil in spaced relationship. An electrical signal is applied to the spikes and a reflected signal is analyzed using time domain reflectometry to determine an apparent dielectric constant and the bulk electrical conductivity of the soil. With these parameters, the dry density and gravimetric water content of the soil can be calculated using a predetermined relationship between apparent dielectric constant, bulk electrical conductivity, dry density and gravimetric water content. The predetermined relationship includes experimentally determined soil specific calibration constants. The calculated value of the bulk electrical conductivity as determined by time domain reflectometry is adjusted to correspond to a value for which values of the constants are known. The value of the apparent dielectric constant is adjusted to compensate for temperature.